UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

July 2, 2003

Thomas F. Mueller
Corps of Engineers
Regulatory Branch - CENWS - OD-RG
Post Office Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Hochfeld New Pier and Boatlift (NMFS Tracking No.: 1999/01687).

Dear Mr. Mueller:

The attached document transmits NOAA's National Marine Fisheries Service's (NOAA Fisheries) Biological Opinion (Opinion) and Magnuson-Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) consultation on the US Army Corps of Engineers' (COE) proposed issuance of a 404 permit to Hochfeld for a new pier and new boatlift in Lake Washington. The consultations are in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1536), and section 305(b)(2) of the MSA (16 U.S.C.1855). The COE determined that the proposed actions are likely to adversely affect Puget Sound chinook (*Oncorhynchus tshawytscha*) that occur under NOAA Fisheries' jurisdiction, and adversely affect EFH.

This Opinion is the result of an analysis of effects of the proposal on Puget Sound chinook in Lake Washington. The Opinion and EFH consultations are based on information provided in the Biological Assessment (BA) and other information sent to NOAA Fisheries by the COE on May 6, 2003, as well as additional information transmitted via telephone conversations, e-mail, and fax. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office.

NOAA Fisheries concludes that implementation of the proposed projects is not likely to jeopardize the continued existence of Puget Sound chinook. In your review, please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take. NOAA Fisheries also concludes that the project will adversely affect EFH; conservation recommendations can be found at section 3.0 of the attached document.

If you have any questions regarding this correspondence or the attached document, please contact Kitty Nelson of the Washington Habitat Branch Office at (206) 526-4643.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

cc: Martin Hochfeld

Endangered Species Act - Section 7
Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Hochfeld, New Pier in Lake Washington,
King County, Washington

NMFS Tracking No.: 1999/01687
NMFS Log No.WSB-99-479

Agency: U.S. Army Corps of Engineers

Consultation Conducted By: National Marine Fisheries Service
Northwest Region,

Issued By: For Michael R Crouse Date Issued: June 17, 2003

D. Robert Lohn
Regional Administrator

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1.0 INTRODUCTION

1.1 Background Information

The U.S. Army Corps of Engineers (COE) proposes to issue permits under section 10 of the Rivers and Harbors Act, and section 404 of the Federal Clean Water Act, that would allow construction of a new pier and boatlift near Renton in Lake Washington. This document has been prepared in response to a request from the COE for consultation under the Endangered Species Act (ESA) of 1973, as amended, 16 CFR 1531, and the Essential Fish Habitat (EFH) requirement of the Magnuson-Stevens Fishery Conservation and Management (MSA), 16 USC 1855. This document transmits the NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and EFH consultation based on our review of the effects of the proposed project.

1.2 Consultation History

On December 20, 1999, NOAA Fisheries received a Biological Assessment (BA) and EFH Assessment from the COE, requesting ESA section 7 formal consultation and EFH consultation for the Hochfeld new pier and boatlift project.

The COE initially determined that the proposed project "may affect, is likely to adversely affect Puget Sound chinook (*Oncorhynchus tshawytscha*) and their designated critical habitat." Critical habitat designations on the west coast were still in effect at that time. On July 26, 2001, representatives from the COE and NOAA Fisheries met at the site to discuss the proposed project. On April 4, 2002, NOAA Fisheries agreed with the COE that the project was likely to adversely affect Puget Sound chinook. On May 13, 2002, the applicant and staff from the COE and NOAA Fisheries met to discuss the impacts of the proposed project and additional impact reduction measures. After agreements between the applicant and NOAA Fisheries to revise the project, the COE determined on August 15, 2002 that the proposed project "may affect, is not likely to adversely affect Puget Sound chinook." However, the COE stated that the letter initiating informal consultation would also serve to initiate formal consultation if NOAA Fisheries still found the proposed action likely to adversely affect Puget Sound chinook and their critical habitat.

From December 20, 1999 through August, 2002, the applicant provided additional information necessary to complete the initiation package for consultation. In November 2002, NOAA Fisheries determined that the proposed action is "likely to adversely affect Puget Sound chinook and their habitat" because the proposal permanently adds new development within the south end of the lake, a location upon which the smallest chinook are dependent during the rearing and migrating life stages.

The Opinion is based on information provided at a meeting held on May 13, 2002, in the final BA dated February 25, 2002, the final project plan view and habitat enhancement plans dated

May 6, 2003, and responses to NOAA Fisheries questions dated April 21, 2000 and September 14, 2000.

1.3 Description of the Proposed Action

Mr. Martin Hochfeld owns the subject property, which is located along the southeast shoreline of Lake Washington, approximately one mile north of Coleman Point. The COE proposes to issue a permit to Mr. Hochfeld to construct a new pier with a main walkway 79 feet long and 4 feet wide on the southern portion of his property. The end of the pier will be located in about 16 feet of water at ordinary high water (OHW) (COE Datum at 21.85 feet). The pier structure will be built with ammoniacal copper zinc arsenate (ACZA) treated wood. Four 8 inch and four 4 inch diameter steel pilings will be driven into the substrate to support the entire structure. At the east end of the main walkway, Mr. Hochfeld will construct two 36-foot long finger piers perpendicular to the walkway to provide temporary summer moorage for the owner's 42-foot boat and moorage for guest boats. The outer-finger pier will be 4 feet in width while the shoreward finger pier will be 2 feet in width. The lowest portion of the decking will be at least 2 feet above OHW. Two steel mooring piles will be installed north of the pier to secure the boat. The over-water coverage of the pier will be approximately 543 square feet. Twelve prisms approximately 2 inches wide by 12 inches long are proposed for the walkway. The pier will be connected to the shoreline on the bulkhead and foundation of the house so the applicant can access the pier from his home.

Mr. Hochfeld's boatlift is designed to sit on the lake bottom, along the southern side of the pier, in 4 feet of water. The boatlift requires a maximum of 4 feet of water depth to function. The dimensions of the boatlift are 7 feet wide by 8 feet long. The boatlift will support a 13-foot waterski boat.

Conservation Measures

Mr. Hochfeld has proposed measures to minimize project impacts. These measures will be carried out using only hand labor and are considered elements of the proposed action. He will remove some existing debris from the water in front of his property (three or four large concrete blocks and two tires). He will leave in place two naturally occurring snags that have fallen into the water, and five stumps that exist on either side of the proposed pier. In addition, rocks larger than 4 inches in diameter will be removed by hand along the entire length of the shoreline. Mr. Hochfeld will place half-inch diameter washed pea gravel on the substrate the entire length of the shoreline from the OHW mark to a 3-foot depth to provide beach nourishment and suitable spawning habitat for sockeye salmon (*Oncorhynchus nerka*). The pea gravel will be spread to a 3 inch depth except at the OHW, where the depth will be greater to allow for some movement of the gravel by wave action. The pea gravel will not be placed over the two existing sand patches in the shallows.

On the north end of the property, Mr. Hochfeld will remove existing blackberries (*Rubus sp*) without the use of chemicals and plant five willows (*Salix geyeriana* or *Salix hookeriana*), 17 bulrushes (*Scirpus actus* or *Scirpus microcarpus*) and a mixture of eight sedges and rushes (*Carex rostrata* and *Juncus ensifolius*) at the edge of the water. Any milfoil *(Myriophyllum spicatum*) that exists on the site will be removed by hand to a depth of 2 feet at OHW indefinitely or until the milfoil is no longer growing at the site. He will construct the project and conservation measures between July 16 and December 31 to avoid effects to rearing and migrating chinook salmon. To reduce shading effects from the boat, the applicant will not moor boats at the pier between January 1 and June 1. The applicant will also install inverted cones on the pilings to discourage bird use.

Construction Methods

Pier construction will be conducted from a barge and from an existing concrete bulkhead along the shoreline. The barge will not be allowed to ground out at any time during construction (COE 2002). Pilings will be installed by a free-fall hammer from the barge and will be driven during one 24-hour period. Care will be taken to avoid debris from falling into the water. Mr. Hochfeld will install a floating barrier around the project to contain any construction debris that should enter the water. Any debris that does fall into the water will be removed from the site by barge or land vehicle and deposited in an approved disposal site.

Mr. Hochfeld will install a silt fence around the in-water planting area to avoid suspended sediments from spreading to deeper water. He will protect new plantings with string or twine criss-crossed over the top of the fencing. The fence will remain in place until the plants are established, but no longer than six months from pier installation.

Monitoring Plan

Mr. Hochfeld will assure an 80% survival of planted terrestrial vegetation after five years and make "good faith" efforts to establish the emergent vegetation. He proposes to photographically monitor emergent vegetation from permanent photo locations for five years and to provide the COE an annual statement of the condition of the riparian and emergent vegetation. Photographs will be taken twice yearly, once at low water during December or January and once at high water during June or July. Mr. Hochfeld will submit the statement and photographs to the COE by February 28 of each year of the monitoring period.

1.4 Description of the Action Area

For consultations under ESA section 7, 50 CFR 402.02(d), the implementing regulations define "action area" as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area for this project includes the open water area and shoreline of Lake Washington because this area will be indirectly affected by the boats that are to be moored at the new pier. Activities occurring under the proposed action would occur within a portion of the range of chinook salmon including rearing and migrating habitat along the perimeters of Lake Washington, Lake Union, and the Lake Washington Ship Canal to Puget Sound.

2.0 ENDANGERED SPECIES ACT

2.1 Biological Opinion

The objective of ESA consultation is to determine whether or not Federally funded or approved activities are likely to jeopardize the continued existence of Puget Sound chinook, or destroy or adversely modify their critical habitat. Critical habitat is not currently designated for Puget Sound chinook, therefore, that analysis will not be presented in this document. The standards for determining jeopardy are described in section 7(a)(2) of the ESA and further defined in 50 CFR 402.14.

2.1.1 Evaluating the Proposed Action

In making its jeopardy analysis, NOAA Fisheries determines if the proposed action will impair the listed species' potential to survive and recover. This analysis involves the initial steps of (1) defining the biological requirements, and (2) evaluating the relevance of the environmental baseline to the species' current status. NOAA Fisheries must then consider the estimated level of injury mortality attributable to: (1) collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life stages that occur beyond the action area. Significant impairment of recovery efforts or other adverse effects which rise to the level of "jeopardizing" the "continued existence" of a listed species can be the basis for issuing a "jeopardy" opinion (50 CFR 402.02).

2.1.2 Biological Requirements

The relevant biological requirements are those conditions necessary for the Puget Sound Evolutionarily Significant Unit (ESU) of chinook salmon to survive and recover to naturally reproducing population levels, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become or continue to be self-sustaining in the natural environment. The biological requirements for salmonids can be defined as habitats that have properly functioning conditions (PFC) relevant to any chinook life stage. Habitat conditions include all parameters of NOAA Fisheries' recently developed draft matrix of pathways and indicators for lakes (lakes matrix) (Appendix 1). NOAA Fisheries has determined that the specific biological indicators affected by the proposed action are physical barriers (migration), habitat structural complexity (woody debris, submergent, and emergent vegetation), riparian vegetation structure, substrate composition, chemical contamination (from treated wood) and non-native species.

During their residence in and migration through Lake Washington, juvenile chinook require refugia for resting, feeding, growth, and predator avoidance. Recent studies by United States Fish and Wildlife Service (USFWS) indicate that juvenile chinook need a diverse habitat including open water areas and areas with woody debris to meet these requirements (Tabor and Piaskowski 2001). The smallest juvenile chinook are only found along shallow shorelines with small substrates such as sand and gravel both during the day and night. The smallest juveniles also used woody debris and overhanging vegetation as resting sites and for refuge from predators. As they grow, chinook avoid over-water structure, rip rap and bulkheads and move into deeper water.

2.1.3 Status of the Species

NOAA Fisheries completed a status review of chinook salmon from Washington, Idaho, Oregon, and California in 1998, which identified fifteen distinct species (ESUs) of chinook salmon in the region (Myers *et al.* 1998). After assessing information concerning chinook salmon abundance, distribution, population trends, risks, and protection efforts, NOAA Fisheries determined that chinook salmon in the Puget Sound ESU are at risk of becoming endangered in the foreseeable future. Subsequently, NOAA Fisheries listed Puget Sound chinook salmon as threatened on March 24, 1999 (March 1999, 64 FR 14308). This listing extends to all naturally spawning chinook salmon populations residing below natural barriers (e.g., long-standing, natural waterfalls) in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula, inclusive.

Historically, 31 quasi-independent populations of chinook comprised the Puget Sound ESU. The populations that are presumed to be extirpated were mostly the early-returning chinook (spring-type chinook), and most of these fish returned to the mid to southern parts of Puget Sound, Hood Canal and the Strait of Juan de Fuca. Recently, the Puget Sound Technical Recovery Team (PSTRT), an independent scientific body convened by NOAA Fisheries to develop technical delisting criteria and guidance for salmon delisting in Puget Sound, identified 22 geographically distinct populations of chinook salmon remaining in the Puget Sound ESU including the Cedar River population (PSTRT 2001, 2002; BRT 2003). These population designations are preliminary and may be revised based on additional information or findings of the PSTRT. Through the recovery planning process NOAA Fisheries will define how many and which naturally spawning populations of chinook salmon are necessary for the recovery of the ESU as a whole (McElhany *et al.* 2000).

The PSTRT has determined chinook in the north Lake Washington tributaries and the Cedar River are geographically distinct from chinook in other Puget Sound streams (NMFS 2001). The geographic separation between spawning areas in north Lake Washington and the Cedar River support the genetic separation of the two populations (NMFS 2001). The Cedar River chinook salmon stock is the stock of special concern for this consultation because of the location of the project near the mouth of the Cedar River. The Cedar River stock is an ocean-type chinook and is considered to be a native spawning naturally-produced stock (WDFW 1994).

Factors for decline include anthropogenic activities which have blocked or reduced access to historical spawning grounds and altered downstream flow and thermal conditions. In general, upper tributaries have been impacted by forest practices while lower tributaries and mainstem rivers have been impacted by agriculture and/or urbanization. Diking for flood control, draining and filling of freshwater and estuarine wetlands, and sedimentation due to forest practices and urban development are cited as problems throughout the ESU (WDF *et al.* 1993).

Status of the Species in the Action Area

All juvenile and adult chinook from the Lake Washington watershed migrate through the Ship Canal and Lake Washington to and from their spawning grounds. The close proximity of the project to the Cedar River and May Creek (where chinook also spawn and rear) suggests that the Cedar River population is the primary population that will be affected by the proposed project. Thus, although the north Lake Washington chinook population also migrates throughout the lake, only the Cedar River chinook population will be discussed in the remainder of this Opinion.

Lake Washington chinook salmon are one of the weaker key stocks in the mix of chinook populations affected by on-going pre-terminal fisheries (PSIT and WDFW 2001). The low abundance or generic critical threshold for fisheries management changes is 200 spawners, a point at which the population becomes very unstable genetically and demographically. When escapement reaches 200, the fisheries are severely restricted or eliminated (Susan Bishop, biologist, NOAA Fisheries, pers. comm., January 7, 2003). Escapement to the Cedar River has been consistently below the goal of 1,200 spawners and fishing of this stock since 1974 has been closed a total of seven years. Chinook escapement in the Cedar River fell below 200 during two of the past ten years. Spawning escapements for Puget Sound chinook in the Cedar River have ranged between a high of 681 in 1995 to a low of 120 in 2000. During the fall of 2001, the preliminary estimate of escapement to the Cedar River index reach exceeded 800, the largest return since 1987 (PSTT and WDFW 2002). Escapement for 2002 is estimated at 600 (Mike Mahovlich, biologist, MIT, pers. comm., December 10, 2002). However, the Cedar River population abundance level has displayed a lot of volatility and is still considered to be far below what is needed to sustain the population (Susan Bishop, biologist, NOAA Fisheries, pers. comm., January 7, 2003).

Habitat alterations and availability are clearly understood to impose an upper limit on the production of naturally spawning populations of salmon. The National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRC 1996). Some of the habitat impacts identified were the fragmentation and loss of available rearing habitat, degradation of water quality, removal of riparian vegetation, and decline of habitat complexity (NMFS 1998; NRC 1996) all of which occur in Lake Washington.

2.1.4 Environmental Baseline

The environmental baseline is the current set of conditions to which the effects of the proposed action will be added. The term “environmental baseline” means “the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02).

Lake Washington waters cover 28.0 square miles and the shoreline length is about 72 miles. In the southern half of the lake is Mercer Island, which has an area of 6.5 square miles and accounts for about 19% of the lake's total shoreline. Lake Washington has sustained a long and substantial history of human alteration. In 1897, Bowers described Lake Washington as follows: "Nearly all the hills are covered with a dense growth of trees, except where clearings have been made for homes and settlements. The shoreline in nearly all parts is fringed with a dense undergrowth of brush and small trees; tule grass is found at every low point and light indentation.... only in a few places along the shore of the entire lake is the bottom sufficiently free from snags, fallen trees, and other material to permit the successful hauling of nets." Currently, over 78% of the lake shoreline has been developed for residential land use (Tabor and Piaskowski 2001).

Since the early 1900s large scale and small scale hydraulic changes have been made to the Lake Washington system. In 1916, the elevation of Lake Washington was lowered from the construction of the Lake Washington Ship Canal and Government Locks and the Cedar River was diverted from the Black River into Lake Washington and to Puget Sound via the Ship Canal. The approximate 9-foot reduction in lake level eliminated much of the available shallow-water and fresh-water marsh habitat and decreased the length of the shoreline of Lake Washington. Over 9.5 miles of shoreline and an estimated 1,013 acres of wetland in Lake Washington were lost as a result (Chrzastowski 1983). In addition to the loss of shoreline habitat, currently about 71% of the existing lakeshore is armored with bulkheads or riprap and approximately 2,737 residential piers have been built (Toft 2001). On average, 36 piers occur per mile, or, one pier for every 146 feet of shoreline (Toft 2001).

When the lake level was lowered, the Black River was disconnected from the Lake Washington system. The Black River currently flows at a much reduced volume into the Green River, and is located in an entirely different watershed. The Cedar River is now the primary source of fresh water to Lake Washington, the other source being the Sammamish River at the north end of the lake. Other major structural changes to the system included the connection of Lake Union to Lake Washington via the Montlake Cut, and the enlargement of the former outlet of Lake Union to form the Fremont Cut (Kahler 2000).

The Lake Washington Ship Canal and Chittenden Locks were constructed near the western end of Salmon Bay. This structural change converted the former saltwater inlet to a freshwater channel and effectively eliminated over 4 miles of estuarine habitat removing the primary habitat where juvenile chinook acclimate to salt water (Chrzastowski 1983). The Ship Canal and Chittenden Locks provide navigable access between Lake Washington and Puget Sound for commercial and pleasure craft. In the winter months, the water level is drained down to an established lower limit in order to facilitate clean-up and pier repairs along the Ship Canal and the shores of Lake Washington (Chrzastowski 1983).

The diversion of the Cedar River and drop in water level of Lake Washington affected both the fish populations and habitat conditions (Kahler 2000). Cedar River fish stocks previously adapted to a riverine migration and an extensive estuary were abruptly routed into Lake Washington, a change that required a different migration through the lake and a swift transition into colder, more saline conditions below the Chittenden Locks.

Habitat conditions in Lake Washington have also substantively changed around the lake shoreline and the riparian boundary. The COE regulates the water level in Lake Washington to provide fresh water to operate the locks, to maintain stable lake levels during flooding periods, and for maintenance. Consequently, Lake Washington is managed like a reservoir to fluctuate only 2 feet rather than the 7-foot fluctuation that was common historically. Because of the COE operations, the normal high water/low water regime has been reversed from natural conditions so that the water level is high in the summer and low in the winters. The hardstem bulrush and willow that once dominated the shoreline community has been replaced by developed shorelines with landscaped yards (Kahler 2000). As a consequence, the loss of natural shoreline has changed and reduced the amount of complex shoreline features such as overhanging vegetation, submerged root systems, emergent vegetation, woody debris, and substrate.

The COE regulation of the water level in the Lake Washington system has not similarly affected the shoreline of Lake Union because the historical water-level fluctuation was similar to the present. Rather, losses of wetland and shoreline vegetation in Lake Union are attributable to filling and shoreline development (Kahler 2000).

The species composition of plants and animals that live in and around Lake Washington has also changed dramatically with the introduction of non-native plants and animals during the later half of the nineteenth century. At least 15 species of non-native fish have been introduced to Lake Washington (Ajwani 1956). In 1918 largemouth bass (*Micropterus salmoides*), a non-native predator of juvenile chinook were introduced into Lake Washington (Pfeifer 1992). Introduction of smallmouth bass (*Micropterus dolomieui*) occurred later, possibly during the early 1960s (Pflug 1981). Smallmouth bass have been documented to prey on juvenile chinook (Pflug 1981). Another non-native predator of chinook is the yellow perch (*Perca flavescens*).

Many non-native invasive plants such as Eurasian milfoil (*Myriophyllum spicatum*) and reed canary grass (*Phalaris arundinacacea*) are found in the lake or in the riparian buffer. Eurasian milfoil in particular may be harmful to juvenile fish. Dissolved oxygen levels under dense patches of Eurasian milfoil and fragrant white water lily (*Nymphaea odorata*) that were consistently less than 4 milligrams per liter (mg/L) were lethal to caged steelhead trout in Lake Washington (Frodge *et al.* 1995). Bjornn and Reiser (1991) concluded that salmonids may be able to survive when dissolved oxygen concentrations are relatively low (less than 5 mg/L), but growth, food conversion efficiency, and swimming performance will be adversely affected.

Factors Affecting Species in the Action Area

The effect of human activities on salmon habitat is one of the primary causes of the decline of salmon throughout the Pacific Northwest (Myers *et al.* 1998; NRC 1996). Habitat impacts identified that are applicable to the action area are these: estuarine loss, loss of large woody debris (LWD), and blockage or passage problems associated with dams or other structures (March 9, 1998, 64 FR. 11494). Land use activities associated with urban development among others have significantly altered fish habitat quantity and quality (Myers *et al.* 1998). Impacts associated with these activities included elimination of rearing habitat, removal of vegetation, and elimination of LWD recruitment (Myers *et al.* 1998).

The biological requirements of the listed species are not being met under the present environmental baseline conditions in the action area. Long-term declines in distribution and abundance of chinook may be attributed to significant historic structural and hydrologic changes, water withdrawals and impoundments, urbanization, habitat degradation, and habitat accessibility in the action area and throughout the watershed. Continuing development on the shoreline in the action area also affects salmonid habitat. In the action area, habitat functions that will be affected by the proposed action include changes to shoreline vegetation and riparian structure, substrate composition, structural complexity, habitat access, non-native species and chemical contamination through the use of treated wood. To improve the status of chinook, improvements in the quality and quantity of the species' habitat are needed to support chinook migration and rearing activities.

2.1.5 Relevance of Baseline to Status of the Species

Presently, the biological requirements of Puget Sound chinook are not being met under the environmental baseline. The factors for decline that contributed to the need for listing the ESU continue to be present in the action area as baseline conditions. As a general matter, to improve the status of the listed species, significant improvements in the habitat conditions are needed. Conditions along the shoreline need to improve to allow natural processes to occur that allow habitat formation and maintain water quality necessary to sustain fish. Specifically, riparian vegetation, in-water vegetation and woody debris need to be re-established in and around the shoreline. Additionally, because armoring of the shoreline changes shoreline gradients and sediment supplies to the lake, a decrease in structural armoring is needed to allow natural processes to occur and to maintain shoreline conditions that juvenile salmon prefer. These actions could enhance salmonid survival and production in the basin.

2.1.6 Effects of the Proposed Action

The ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on threatened or endangered species or habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 CFR 402.02). These effects, when added to the effects on listed species from the baseline condition, and cumulative effects, are analyzed to determine whether or not a project will jeopardize the continued existence of a listed species.

2.1.6.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated actions and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated as they would be the subject of future consultation under ESA section 7. Direct effects of new piers include those from shade from the new pier and moored boats, shoreline modification where the pier is connected to land, chemical contamination from treated wood and the construction impacts of turbidity and pile-driving noise.

2.1.6.1.1 Shade. Mr. Hochfeld proposes to install twelve prisms (each prism 24 square inches) in the walkway in order to allow the equivalent of 100% light transmission through the pier (U.S.COE 2002). A common misconception from a study conducted on prisms (Schefsky 1998) is that the light reaching their surface increases when it passes through the prism, or, in effect, that prisms can create light under the pier. In fact, the standard prisms proposed for pier projects actually absorb light and pass only 58% of the incident light that reaches their surface (Richard J. Schefsky, engineer, Northwest Laboratories of Seattle, Inc., pers. comm., October 9, 2002). In reality, the twelve prisms will allow transmission of two square feet of light through the deck surface (about 0.4 percent of the pier surface will transmit light). If each prism passes only 58% of incident light then less than 0.2 percent of the light that reaches the surface of the pier is transmitted by the prisms under the pier. In a study of different lighting designs under ferry piers in Puget Sound prisms were found to pass the least amount of light when compared with glass blocks, grating and the other lights transmitting designs (Blanton *et al.* 2002). In addition, the applicant proposes to leave a three-eighths-inch space between the deck boards. No information was provided to NOAA Fisheries to estimate how much light will pass under the pier from the spaces between the boards. Based upon the foregoing information, NOAA Fisheries reasons that the structure will shade the water and substrate below. Preliminary studies by NOAA Fisheries 2003 indicate that piers with open space of at least 50% transmit significantly more (an order of magnitude more) photosynthetically active radiation (PAR) than prisms (Perry Gayaldo, biologist, NOAA Fisheries, pers. comm., June 20, 2003).

The effects on juvenile chinook of shade produced from piers in Lake Washington is not well understood. Shading can cause loss of submerged aquatic vegetation, alteration of habitat used by juvenile salmon, potential loss of salmon prey resources, and potential interruption of fish migratory patterns. Juvenile salmon in Puget Sound have been observed to alter their behavior upon encountering piers (Simenstad *et al.* 1999). Salmon behavior responses to light variations are based on the differences between the ambient light level to which the fish have been exposed before they encounter any changes in the quality or intensity of light caused by an over-water structure. Piers can create sharp underwater contrasts by casting shade in ambient daylight conditions, which may, at times, deter juvenile salmon from passing from light to dark water (Blanton *et al.* 2002).

In June 2002, 14 schools of juvenile salmon (about 50-75 fish in each school and thought to be chinook) were observed to turn 90 degrees and swim around, rather than under, a pier where they were being observed. While the pier structure had skirting that extended into the water column, the fish could easily have swum under the pier. Because skirting prevents ambient light from reaching under the pier, the light level was substantially darker under the pier than in the surrounding area. The change in light level could have caused the abrupt change in behavior (Roger Tabor, biologist, USFWS, pers. comm., November 8, 2002).

Tabor and Piaskowski (2001) found that during February and March when juvenile chinook are very small, they used over-water cover (including piers and overhanging vegetation) during the day, but during April and May, as they grew larger, they seemed to avoid over-water structure during both the day and night. Habitat manipulation experiments, however, clearly showed that chinook salmon avoided over-water structure. No juvenile chinook salmon were observed under the artificial docks built for the habitat manipulation experiments, in contrast to the control section where chinook were present 70% of the time (Tabor and Piaskowski 2001).

Because juvenile salmon tend to prefer to migrate along the edges of dark areas (Blanton 2002), new piers with boats moored alongside such as that proposed here, which will create abrupt shade in the Lake Washington near-shore area, might affect migrating and rearing behavior of juvenile chinook. While the effects of piers in Lake Washington on juvenile chinook behavior are not well understood, the presence of so many (2,737) over-water structures might change migration patterns or lead to delayed migration. The consequences of delayed migration are assumed to be detrimental (Simenstad *et al.* 1999).

NOAA Fisheries knows of no research specifically focused on determining what level of light is a barrier or causes changes to juvenile migration behavior in Lake Washington, but it is known that the physical design (e.g., pier height and width, pier orientation, construction design materials, piling type and number) will influence whether the shadow cast on the near-shore covers a sufficient area and scope of darkness to constitute a barrier (Blanton 2002). Such pier avoidance might expose juveniles to greater risk from predation as chinook travel in deeper water around piers.

Typically ocean-type chinook rear a month or more in an estuary to grow and acclimate to salt water conditions thereby improving their survival chances in the marine environment (Healey 1991). Macdonald *et al.* (1988) suggested that without an estuarine residency period, or if chinook are forced through an estuary prematurely juvenile survival will likely be reduced. The estuary of the Lake Washington system was eliminated during construction of the Chittenden Locks and, as a result, juveniles are abruptly introduced to Puget Sound with little time to acclimate to higher salinity and colder temperatures. Juvenile chinook in the Lake Washington system must, therefore, overcome acclimation stresses to survive their transition to salt water. Fish that transition quickly to salt water may be more susceptible to avian or other forms of predation during the short period they are confined to the relatively small freshwater area below the Chittenden Locks. Macdonald *et al.* (1988) noted predation to be a problem for fish that were released directly in water with salinity greater than 11 ppt, suggesting a similar problem may exist for juveniles passing the Chittenden Locks. Thus, the addition of another boat pier contributes to the disruption of outmigrating juvenile chinook, and may contribute to reduced fitness, decreasing the ability to adapt to salt water.

Individual actions that by themselves are relatively minor (such as the construction of a new pier or rebuilding of an existing pier) may be damaging when coupled with other actions that have occurred in a watershed (Spence *et al., pg 27,* 1996). "Regional declines in salmonid populations are the product of numerous incremental changes in the environment. It is thus reasonable to expect that recovery of salmonid populations will proceed in a similar fashion—through incremental improvements in habitat conditions" (Spence *et al., pg 27,* 1996). Because Lake Washington already contains at least 2,737 piers (Toft 2001), effects to juvenile salmonids from new piers and the reconstruction of existing piers, need to be minimized.

Mr. Hochfeld's new pier will have a narrow walkway and a minimal number and diameter of pilings. The pier will be attached to the bulkhead and foundation of the house and therefore will be about 2-3 feet above the OHW mark. The elevated pier is expected to reduce shading from the structure when the sun is not directly overhead. Boats moored at the end of the pier will also minimize the amount of shade in the near-shore area that is most important to chinook rearing. No boat will be in the boat lift or moored in the water between January 1 and June 1, providing some temporal separation of activity impacts to fish. Although these measures are expected to minimize shading, it is not known if these measures are sufficient to avoid changes to rearing and migration behaviors and effects to near-shore habitat.

2.1.6.1.2 Shoreline Conditions. The amount of shoreline hardening where the pier touches the upland will not change because the pier will be attached to a retaining wall that forms the foundation of the house, which is located at the OHW on the south end of the property. Similarly, the construction of the pier will not result in any change to riparian vegetation from existing conditions because vegetation has already been removed to build the house. Any sediment inputs into the lake from the neighboring hillside will be blocked by the house. However, Mr. Hochfeld will remove existing blackberries and plant native willows, bulrushes, sedges and rushes at the edge of the water to improve existing shoreline conditions along the undeveloped northern portion of his property, which is expected to improve over the existing, baseline conditions.

By removing three or four existing concrete blocks and two tires from the water in-front of his property, Mr. Hochfeld will reduce potential predator habitat, and reduce leaching of toxic chemicals from the tires. Rocks larger than 4 inches in diameter will also be removed by hand. A layer of 3 inches of small pea gravel will be spread along the shoreline from the OHW mark to a depth of 3 feet. These beach nourishment activities will provide more suitable substrate for juvenile chinook.

2.1.6.1.3 Water Quality. Water quality will be degraded by the construction of the pier, as well as by the presence and use of the pier. The release of contaminants from treated wood, and from two-cycle outboard motors, will degrade water quality in the action area. Pier installation will mobilize sediments in the water column, temporarily increasing local turbidity levels in the immediate vicinity of the construction activities (several feet). The level of turbidity would likely exceed the natural background levels by a margin significant enough to affect fish, but the duration of this condition will be short-lived and have a low potential for causing harm to chinook, because the spatial scale of the pier installation will be small, restrictions on piling spacing will limit the overall number of pilings installed, and installation will occur when listed species are least likely to be present near the project site.

While steel pilings are proposed, ACZA treated wood is proposed for the surface of the pier. Rainwater that falls on the treated wood will drain directly into Lake Washington causing some unknown level of contamination. The effects on fish from water and sediment contamination from treated wood use in Lake Washington specifically are unknown. It is generally known, though, that treated wood used for pier decking does release contaminants into freshwater and saltwater. Wood treatments include ammoniacal copper zinc arsenate (ACZA) and chromated copper arsenate (CCA) (Posten 2001). Contaminants associated with ACZA and CCA treated wood include copper, arsenate, zinc and chromate, of which copper provides the greatest risk to aquatic organisms. Direct exposure to the contaminants occurs as salmon migrate past installations with treated wood or when juveniles rear near piers constructed with treated wood. Indirect exposure occurs through ingestion of other organisms that have been exposed (Posten 2001). Leaching rates of contaminants from treated wood is highly variable and dependent on many factors (Posten 2001). Consequently, Posten (2001) recommends that use of treated wood for each individual situation needs to be evaluated independently. However, Posten also recommends that assessment of potential impacts of the use of treated wood should include cumulative impact assessment.

Polycyclic aromatic hydrocarbons (PAHs) are commonly released from petroleum based contaminants used in outboard motors such as fuel, oil, and some petroleum-based hydraulic fluids. PAHs can cause acute toxicity to salmonids at high levels of exposure and can also cause lethal as well as acute and chronic sublethal effects to aquatic organisms (Neff 1985). The PAHs may cause a variety of harmful effects (cancer, reproductive anomalies, immune dysfunction, and growth and development impairment) to exposed fish (Johnson 2000; Johnson *et al.* 1999; Stehr *et al.* 2000).

In summary, turbidity from pile driving is not expected to harm listed chinook but, the use of some treated wood for pier construction, and the operation of boats at the pier site, will introduce some level of water quality degradation that will further deteriorate the environmental baseline and habitat conditions of Lake Washington, affecting chinook to an uncertain degree.

2.1.6.1.4 Pile-Driving Noise. Pile driving, especially with a free-fall hammer, typically causes temporary, intense under-water noise. Free-fall hammers produce sharp spikes of sound which can easily reach levels that harm fishes, and the larger hammers produce more intense sounds.

The extent to which the noise will disturb fishes will be related to the distance between the sound source and affected fish, and also by the duration and intensity of the pile-driving operation. The noise caused by free-fall pile-driving would likely elicit a startle response from chinook near the sound source. After the initial strikes, the startle response wanes and the fish may remain within the field of a potentially-harmful sound (1997; NOAA Fisheries 2002). Salmonids may be physically harmed by peak sound pressure levels that exceed 180 dB (re: 1 μPa) while behavior may be disrupted at root-mean-squared (rms) sound pressure levels that exceed 150 dB (re: 1 μPa) (NOAA Fisheries 2003).

For the proposed actions, pile-driving sound is expected to have a minimal impact on listed fish although the applicant will be installing the piles with a free-fall hammer rather than a vibratory hammer. Pilings will be installed within one day and the probability of take will be minimized by the small size of the pilings and the small number of pilings to be installed. Pile driving would occur within the COE/NOAA Fisheries/USFWS designated work window when listed species are least likely to be present near the project site, minimizing the potential for adverse effects.

2.1.6.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects might include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. These actions must be reasonably certain to occur, or be a logical extension of the proposed action (50 CFR 402.02).

2.1.6.2.1 Predation. The pier is proposed in an area where listed salmonids migrate and rear in the presence of predators. Predation occurs throughout the life cycle of salmonids and is an important mortality agent. Piscivorous fish are generally considered to be the most important predators of juvenile salmon (Healey 1991). In Lake Washington, juvenile chinook and coho are limited more by predation than by lack of food (Mazur 2002).

Based on abundance, the most important piscivorous predators of juvenile chinook in Lake Washington are cutthroat trout (*O. clarki clarki*), northern pikeminnow (*Ptychocheilus oregonenesis*), and prickly sculpin (*Cottus asper*) (Beauchamp, biologist, University of Washington, pers. comm., December 18, 2002). Population estimates for predators in the lake are unknown, consequently the magnitude of their predation effect is not known.

Smallmouth bass and largemouth bass both are non-native predators on juvenile chinook. Bass are thought to be less abundant than these other predators but spatial and temporal overlap between smallmouth bass and chinook in the nearshore, and the structural habitat preference of smallmouth bass, are the causes for concern about their predation on juvenile chinook.

Smallmouth bass nests are located in the shallow littoral zone. The average depth of bass nests was 6.3 feet and the range was between 4-12 feet deep. The substrate at nest sites was primarily gravel and sand, and over 90% of the nests observed in 2001 were located within 6 feet of anthropogenic structure (Fresh *et al.* (2001). Fresh *et al.* (2001) found that smallmouth bass did not become abundant in littoral areas of Lake Washington until late May and June, after water temperatures had warmed to about 50 degrees Fahrenheit. At this time of year juvenile salmonids are also in the littoral areas. Of the anadromous salmonids that use the littoral zone, juvenile chinook are most at risk to smallmouth bass predation because the timing of migration of smallmouth bass into the littoral area of the lake coincides with the peak occurrence of juvenile chinook salmon in this habitat (Fresh *et al.* 2001).

While smallmouth bass are considered to be a source of mortality of anadromous salmonids during periods of peak juvenile migration both under natural conditions, and when released from hatcheries (Pflug and Pauley 1984), other researchers have documented that the diet of smallmouth bass in the Lake Washington watershed consists of crayfish and benthic and pelagic fishes (Pflug 1981; Fayram and Sibley 2000). Pflug and Pauley (1984) provided evidence that smallmouth bass do not selectively feed on salmon, but rather are random feeders eating whatever prey are available. The movement of smallmouth bass into littoral areas is not thought to be strictly related to abundance of juvenile salmonids, but rather is likely related to reproduction or seasonal shifts in primary food items (Fresh *et al.* 2001).

Predation on juvenile chinook by smallmouth bass, largemouth bass, and possibly other species may be increased by addition of the proposed docks. Over-water structures create a light/dark interface that allows ambush predators to remain in the darkened area (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Prey species moving around structure are unable to see predators in the dark area under the structure and are more susceptible to predation. While NOAA Fisheries is not aware of any studies to specifically determine impacts of in/over-water structures on salmon, predation studies do suggest predation is a likely consequence of building these structures (Fresh *et al*. 2001).

To illustrate, smallmouth bass are ambush predators, which lie-in-wait, then dart out at the prey in an explosive rush (Gerking 1994). Light plays an important role in defense from predation. Prey species are better able to see predators under high light intensity, thus providing the prey species with a relative advantage (Hobson 1979). Petersen and Gadomski (1994) found that predator success was higher at lower light intensities. Howick and O'Brien (1983) found that in high light intensities, prey species (bluegill) can locate largemouth bass before they are seen by the largemouth bass, which are also ambush predators. However, in low light intensities, the largemouth bass can locate the prey before they are seen. Walters *et al.* (1991) found that high light intensities may result in increased use of shade producing structures by predators. In studies on smallmouth bass Bevelheimer (1996) found that ambush cover and low light intensities created a predation advantage and increased foraging efficiency of smallmouth bass.

Largemouth bass inhabit vegetated areas, open water, and areas with cover such as piers and submerged trees (Mesing and Wicker 1986). Colle *et al.* (1989) found in lakes lacking vegetation, that largemouth bass preferred habitat associated with piers. Wanjala *et al.* (1986) found that adult largemouth bass in a lake were generally found near submerged structures suitable for ambush feeding.

Fresh *et al.* (2001) investigated habitat use by predators in Lake Washington and the Ship Canal. The major objective of their research was to evaluate how different types of structure, especially anthropogenic habitat features, affected the distribution of smallmouth bass. They found that the numbers of smallmouth bass at various locations in Lake Washington and in Lake Union/Ship Canal varied considerably. However, habitat selection is not always based solely upon features of the habitat that are available to the fish; habitat used by any individual smallmouth bass will reflection of the interaction of a number of biotic and abiotic factors, of which structure is only one factor (Bevelheimer 1996). Fresh *et al.* (2001) concluded that large-scale factors (lake scale) like substrate type determine whether an area is used by smallmouth bass.

The kind and amount of substrate (sand, mud and cobble) was the most important factor for bass presence or absence (Fresh *et al.* 2001). Smallmouth bass were generally less abundant at sites that had large amounts of mud and tended to be found associated with sites that had some cobble. Some features at each of the surveyed sites (*e.g*., rip rap wall at Coleman Point) suggest that these features are also critical to the bass presence. Coleman Point, which is about one mile south of the proposed project, had by far the most smallmouth bass of any other site surveyed. There, 61% of the smallmouth bass associated with sand and rip rap. Most nests were constructed in clean substrate that consisted of some mix of sand, gravel, and cobble. In general, the same substrates were used by smallmouth bass regardless of structure use.

Other anthropogenic structure such as pipes, brick, old out-board motors and cut-off pilings also attracted bass (Kurt Fresh, biologist, NOAA Fisheries, pers. comm., May 8, 2002). Natural cover (*e.g*. logs and large boulders) was most important to the smallmouth bass in the deeper areas that were surveyed, and was rarely used in the shallowest portion of the littoral zone probably because most natural cover such as logs and root systems have been removed from the shoreline.

At the site scale, the presence of structure had an important influence on the distribution of smallmouth bass as 75% of the bass seen were within 6 feet of some sort of structure (Fresh *et al.* 2001). The smallest size class of smallmouth bass was more associated with structure than the largest size class. Over-water structures were the type of structure most used by smallmouth bass (Fresh *et al.* 2001). A total of 49% of the smallmouth bass were associated with piers and were observed underneath the structure. Smallmouth bass did not use pier habitat in proportion to its availability and did not use piers equally but preferred some structures over others. Fresh *et al.* (2001) could not explain the preference for some piers over others. Whether the structure or the shade provided by the over-water portion was more important to bass preference was not clear.

Depth and substrate at the project site appear to be conducive to use by both rearing and migrating salmonids, and smallmouth bass. Although structure does not appear to be limiting to smallmouth bass in Lake Washington, the substrate conditions at the site are preferred by smallmouth bass. Two large existing snags are located on either side of the proposed pier. Water clarity at the site is such that predator and prey species currently enjoy good visibility. The addition of in-water structure will likely provide cover/hiding refuge for predators. The addition of over-water structure will result in some level of shading which will provide hiding areas for predators from which they may capture salmonids. The relative roles that additional in/over-water structure and reduced light play in benefitting predaceous fish is unknown.

Increasing the amount of potential spawning habitat could increase the smallmouth bass population and therefore predation on juvenile chinook. Increasing the amount of structure such as a pilings could increase hiding places and favor the ambush of juvenile chinook. Increasing the amount of shade in shallow water could also favor concealment of smallmouth bass and increase the risk of predation to juvenile chinook.

NOAA Fisheries believes the scientific literature and recent studies relating to predator/prey behavior indicates that the addition of in/over-water structures such as piers, likely increases predator success under certain conditions. We believe those conditions exist at the site of the proposed pier. First, Puget Sound chinook are found all around the lake and are the appropriate size for these predators. Considering the proximity of the proposed pier to the Cedar River and Kelsey Creek, the likelihood that some juvenile chinook rear in the project area is high. Second, juvenile chinook and bass presence in the near-shore area overlap temporally and spatially. Much of the smallmouth bass predation on salmonids in the Lake Washington system corresponds with the out-migration of smolts in the spring and summer (Kahler *et al.* 2000).

The proposed new pier will add approximately 543 square-feet of over-water coverage, nine new pilings, and a 56 square-foot boatlift (more in-water structure). The indirect effect of the new pier, pilings, and boatlift is addition of structure preferred by smallmouth bass for foraging territory and potential spawning habitat (Pflug 1981, Pflug and Pauley 1984). Small diameter pilings spaced at least 18 feet apart is expected to reduce structure-dependent benefits to predaceous fish, as compared to traditional pier designs, and the potential for interaction between predators and the most vulnerable juvenile salmonids will be reduced by locating finger piers for temporary moorage in water as deep as possible (spatial separation). These measures will reduce the potential for artificial structure to create near-shore habitat conditions favoring predation of chinook.

Although the proposed design is expected to minimize the impact on the Cedar River population, NOAA Fisheries expects some predation on this population to occur. Salmon stocks with already low abundance, such as the Cedar River population, are susceptible to further depression by predation (Larkin 1979). Similar to the statements above in the direct effects discussion of shade, the presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior and depressing their rate of growth (Dunsmoor *et al.* 1991).

2.1.6.2.2 Littoral Productivity. Piers may also have some general effects on littoral productivity. The shade that piers create can inhibit the growth of native aquatic macrophytes, non-native macrophytes such as milfoil and other plant life (*e.g.*, epibenthic algae and pelagic phytoplankton). Although a reduction in non-native macrophytes from shading would be beneficial, the shade from a pier would not be selective and would also reduce growth of native macrophytes, algae, and plankton as well. Macrophytes are the foundation for most freshwater food webs and their presence or absence affects many higher trophic levels (*e.g.*, invertebrates and fishes). Consequently, the shade from piers may affect local plant/animal community structure and species diversity. At a minimum shade from piers may affect the overall productivity of littoral environments (White 1975; Kahler *et al.* 2000).

Additional litter input from riparian planting may partially compensate for a change in productivity. Prisms and small gaps between boards on the deck surface might result in some improved light conditions beneath the proposed structure compared to a solid surface. Impacts to the littoral environment will be reduced further by positioning the largest part of pier in the deepest water. However, the effect of these measures on native species is unknown. Consequently, it is unknown to what degree the proposed action will negatively affect listed native species through changes in productivity and trophic interactions.

2.1.6.2.3 Boating Activity. A new residential pier incrementally increases levels of boating activity in the lake. Boating activity may have several impacts on listed salmonids and aquatic habitat. Engine noise, prop wash, and the physical presence of boat hulls may disturb or displace nearby fishes (Mueller 1980; Warrington 1999a). Boat traffic may also cause: (1) increased turbidity in shallow waters; (2) uprooting of aquatic macrophytes in shallow waters; (3) aquatic pollution (through exhaust, fuel spills, or release of petroleum lubricants); and (4) shoreline erosion (Warrington 1999b).

These boating impacts indirectly affect listed fish in a number of ways. Turbidity may injure or stress affected fishes, as previously discussed. Increased wave action could displace juveniles from feeding along the shoreline and increase shoreline erosion during a time period when the lake would be expected to be relatively calm. The loss or change in aquatic macrophytes may expose salmonids to predation, decrease littoral productivity, or alter local native species trophic interactions. Pollution may also affect fishes from impacts to potential prey species or aquatic vegetation.

2.1.7 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 C.F.R 402.02). Future Federal actions that are unrelated to the proposed actions are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

In the action area for this project, NOAA Fisheries does not expect further major riparian buffer degradation because all of the land is either currently developed for residential or commercial purposes, or is publicly owned and used as park land.

2.1.8 Conclusion

NOAA Fisheries concludes that the proposed action, considered together with effects from the baseline and cumulative effects, is not likely to jeopardize the continued existence of Puget Sound chinook. NOAA Fisheries bases its conclusion on the fact that, while the construction and installation of the proposed pier will degrade some baseline habitat functions locally, it will not appreciably reduce the functioning of already impaired habitat or retard the long-term progress of impaired habitat towards PFC at the ESU scale. The non-jeopardy determination is due to Mr. Hochfeld's incorporation of improved design criteria incorporating the following features: (1) minimal four-foot walkway with no part of the pier wider than 6 feet; (2) pier deck elevated a minimum of two feet above the OHW COE Datum; (3) limited number of small diameter steel pilings; (4) vegetative shoreline improvements; (5) and the removal of debris that could function as habitat for predators in the proposed action.

Components of the proposed project will incrementally improve shoreline vegetation, riparian structure, and substrate composition. Whether habitat access will be affected or not by shading from the pier is uncertain. While additional shade and structure in the water from the decking, boatlift and pilings may improve predator habitat, and water quality will be degraded for the life of the project, from boating activity associated with the pier these effects are expected to be minimal. Therefore, despite the direct and indirect negative effects, NOAA Fisheries concludes that the proposed project, in total, will minimize harm to conditions required for survival of the Cedar River chinook population.

2.1.9 Reinitiation of Consultation

As provided in 50 CFR 402.16, where discretionary Federal agency involvement or control over the action has been retained by the Action Agency (or is authorized by law), consultation must be reinitiated if: the amount or extent of incidental take is exceeded; new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this Opinion; the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The proposed action will add approximately 543 square feet of over-water structure and 104 cubic feet of in-water piling structure, not including the boat lift. This project will also improve 60 lineal feet of shoreline and 30 lineal feet of riparian habitat to conditions more favorable for chinook. If the extent of construction should vary from these limits, effects not previously considered would result, work must stop, and the COE must reinitiate consultation.

2.2 Incidental Take Statement

Section 9 of the ESA, and regulations pursuant to Section 4(d) of the ESA, prohibit take of listed species. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect a listed species, or attempt to engage in any such conduct, without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary; for the exemption in section 7(o)(2) to apply, they must be implemented by the action agency so that they become binding conditions of any grant or permit issued to the applicant as appropriate. The COE has a continuing duty to regulate the activity covered in this incidental take statement. If the COE fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. The take statement also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of the Take

Listed chinook use the Action Area for migratory and rearing activities. Fresh (2001) notes that a few juveniles of every cohort remain in Lake Washington for an additional year, therefore, take of these listed fish is reasonably likely to occur incidental to the proposed action, despite measures included in the proposed to reduce this likelihood. Because fish presence is dependent upon a variety of fluctuating factors, such as age, size, prey availability, despite the use of the best scientific and commercial data available, NOAA Fisheries cannot estimate the number of fish that would be present in the action area or the project site either during construction or in subsequent years. Therefore NOAA Fisheries cannot estimate the number of chinook that may be injured or killed as a consequence of this project.

NOAA Fisheries believes incidental take of listed chinook will result from: (1) increased predation by piscivorous fish as an indirect result of the addition of in- and over-water structures; (2) detrimental effects of a new structure from changing normal migratory behavior and rearing and foraging behavior. The spatial extent of these environmental changes to fish habitat serve as a surrogate for estimating the amount of take. As such, the following spatial estimates represent the limits on incidental take that will be exempted through this Incidental Take Statement: the proposed action will add approximately 543 square feet of over-water structure and 104 cubic feet of in-water piling structure, not including the boat lift. For a more detailed discussion of the mechanisms by which take could occur, the reader is encouraged to refer to Section 2.1.6 of the Opinion.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures are necessary and appropriate to minimize take of chinook. These measures shall be integrated into the project design and construction activities and shall ensure that:

1. The COE will further minimize take from shade by minimizing the extent and quality of aquatic predator habitat caused by the permitted project.

2. The COE will minimize take by monitoring to ensure that habitat functions are not degraded by permitted projects.

2.2.3 Terms and Conditions

To comply with ESA section 7 and be exempt from the prohibitions of ESA section 9, the COE must comply with the terms and conditions that implement the Reasonable and Prudent Measures. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure No. 1, the COE shall ensure
    a. the surface of the walkway to the outer finger pier be covered with a surface that allows 60% open surface for light transmission;
    b. no part of the pier, with the exception of the pilings, will be less than two feet above the COE datum of 21.85 feet.

2. To implement reasonable and prudent measure No. 2, for five years the COE shall annually submit to NOAA Fisheries the vegetation monitoring report. The report shall be received by NOAA Fisheries no later than March 31 of each year of the monitoring period.

3. To implement reasonable and prudent measure No. 2, the COE shall ensure that vegetation plans have achieved at least 80% planting survival at the end of the five year period by replacing dead plants annually.

4. To implement RPM No. 2, the COE shall provide access by NOAA Fisheries for purposes of gathering data on under-pier light tranmission and fish use.

2.2.4 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop additional information.

NOAA Fisheries encourages the COE to evaluate the effectiveness for juvenile chinook use of planting emergent vegetation associated with COE permitted projects.

Further, NOAA Fisheries encourages the COE to explore ways to improve salmonid habitat and ecosystem function in the action area, to compensate for habitat impacts associated with piers and boating activity, and to carry out programs for the conservation of endangered species.

NOAA Fisheries requests notification should any of these conservation recommendations be implemented, so that additional actions minimizing or avoiding adverse effects of the project or benefitting listed species or their habitats can be recorded.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The MSA established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (Section 305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or State action that would adversely affect EFH (Section 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (Section 305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA Section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

An EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*O. tshawytscha*); coho (*O. kisutch*), and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.* natural waterfalls in existence for several hundred years) (PFMC 1999). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999; see: http://www.pcouncil.org/salmon/salother/a14.html). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in Section 1.3 and 1.4 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in Section 2.1.4 of the Opinion, the proposed action may result in short- and long-term adverse effects to a variety of habitat parameters. These adverse effects are:

1. Increased turbidity from piling installation and construction staging activities, which

diminishes water quality in the construction area.

2. Increased underwater noise associated with pile driving in the vicinity of the project.

3. Decreased water quality from pier construction and boat operations.

4. Changed in migrating and foraging behaviors for juvenile chinook and coho.

5. Increased predation on juvenile chinook and coho.

6. Reduced littoral productivity long term.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook and coho salmon.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that would adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE, it does not believe that these measures are sufficient to address the adverse effects to EFH described above. NOAA Fisheries believes that adverse effects to the nearshore and riparian areas are minimized to the maximum extent practicable, by the conservation measures described in the BA and therefore has no additional conservation recommendations. To minimize the remaining adverse and aggregate effects to designated EFH for Pacific salmon from shade, and to assure conservation measures are successfully implemented, NOAA Fisheries recommends the following:

1. To minimize the adverse effect of the shadow cast by the pier, the COE should ensure that the surface of the walkway to the outer finger pier be covered with a surface that allows 60% open surface for light transmission.

2. To minimize the adverse effect of the shadow cast by the pier, the COE should ensure that the pier, with the exception of the pilings, be a minimum of two feet above the OHW (COE Datum).

3. To ensure the success of vegetation plans proposed, the COE should monitor the pier annually to ensure permit conditions have been adhered to, and notify NOAA Fisheries of any permit deviations.

4. The COE should ensure that vegetation plans have achieved at least 80% planting survival or replacement of dead plants five years after planting.

3.7 Statutory Response Requirement

Pursuant to the MSA (Section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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Attachment 2

Lake Matrix of Pathways and Indicators for Lake Washington, Lake Sammamish, and the Ship Canal, including Lake Union

Draft 3/11/03

Pathway	Indicators	Properly Functioning (PFC)	At risk	Not Properly Functioning (NPF)	Source
Water Quality	Temperature/Dissol vedOxygen (DO)	At least 50% of water column is <14 C and >5mg/l	Entire water column between 14-18 C and DO between 3-5 mg/l	No portion of water column <18 C or DO less than 3 mg/l	
	pH	6.5-8.5	_	_	WA ST WQ Standards
	Chemical Contamination	Low levels of chemical contamination from agricultural, industrial or private residences, and watercraft, no creosoted or treated wood on site, no pesticide use	Moderate levels of chemical contamination from agricultural, industrial or private residences and watercraft, low amount creosoted or treated wood on site, low amount pesticide use	High levels of chemical contamination from agricultural, industrial or private residences and watercraft, medium to high amount creosoted or treated wood on site, medium to high pesticide use	FW matrix
	Nutrients Total Phosphorous (TP)	No excess nutrients, <10 ppm TP in epilimnion	Some excess nutrients, 10-15 TP in epilimnion	High levels of excess nutrients, >15TP in epilimnion	FW matrix

Habitat Access	Physical Barriers	Fish passage is unimpeded into, through or out of lake at all lake levels	Any man-made barrier that does not allow fish passage through the lake or upstream and /or downstream at any lake level	Any man-made barrier that does not allow fish passage through the lake or upstream and/or downstream at any lake level	FW matrix
Habitat Elements	Non-Native Species (in water-plants and animals)	Diverse plant community dominated by native species/no non-native predation pressure	Co dominance (50%) of non-native and native species/some non-native predation pressure	Non-native plants >80%, moderate non-native predation pressure	
	Shoreline upwelling	No reduction of shorezone upwelling	Any reduction of shorezone upwelling	Elimination of shorezone upwelling	
	Structural complexity (includes woody debris, submergent and emergent vegetation)	Woody debris abundant, diverse submergent and emergent community,	No woody debris	No woody debris, contiguous surface canopy	Bowers 1898
	Substrate composition	No change from natural state, no contaminated sediments	Altered from natural substrate, no contaminated sediments	Significantly altered substrate and/or contaminated sediments	
Shoreline Conditions	Shoreline vegetation and	1 site potential tree height of mixed	Any reduction from 1 site potential tree	<20 feet mixed native trees and	May et al. FW matrix

	riparian structure	native trees and shrubs (200 ft) no TIA*, no lawns, if site appropriate – emergent vegetation	height of mixed native trees and shrubs, 0-4% TIA, lawns within 120 feet of lake	shrubs, >4% TIA, lawns to shoreline	new shorelines rule
	Shoreline gradient	Natural gradient and substrate, no artificial armoring	Any bulkhead or structure that disrupts maintenance of a natural gradient in the riparian zone	Any bulkhead at or within the OHW line	

* Total Impervious Area